

Reserve

U.S. Rural electrification administration.

ELECTRIC LIGHTING -- NEEDS AND BASIC PRINCIPLES

PART I

ELECTRIC LIGHTING - PLANNING LIGHTING FOR THE
FARM HOME

PART II

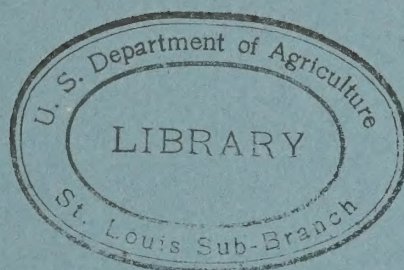
The following material was prepared to assist home agents teachers and others, who may be working with farm women and girls on needs and basic principles of electric lighting.

Utilization Division
RURAL ELECTRIFICATION ADMINISTRATION
Washington, D.C.

ELECTRIC LIGHTING -- NEEDS AND BASIC PRINCIPLES

PART I

The following material was prepared to assist home agents, teachers and others, who may be working with farm women and girls on needs and basic principles of electric lighting.



Utilization Division
RURAL ELECTRIFICATION ADMINISTRATION
Washington, D. C.

NEEDS AND BASIC PRINCIPLES OF LIGHTING

The following is a suggestive outline to use with groups of farm women in studying the needs and basic principles of lighting. However, it may be adapted for use in 4-H clubs and high school home economics classes.

I. Objectives:

To study needs for good lighting.

To learn how good lighting is secured.

To learn what are the qualities of good portable lamps.

II. Setup for Demonstration:

1. Inside frosted bulbs: 150, 100, 75, 60, 50, 40, 20, 15, 10, $7\frac{1}{2}$ watts.
2. 100-200-300 watt three-light lamp.
3. Light meter.
4. I.E.S. student lamp.
5. I.E.S. three-light floor lamp.
6. Pin-up lamp.
7. Shade with dark lining to fit I.E.S. student lamp.
8. Blackened bulb, blue bulb, lumiline, and silver bowl bulb.
9. Two bridge tables near convenience outlet.
10. Extension cord and double or triple plugs.
11. Display of bulletins and other reference source material.

III. Introduction to Demonstration: (10 minutes)

A. Appreciation of past forms of lighting.

- B. Value of good lighting.
- C. Need for planning.
- D. Need for knowledge of basic principles.

IV. Factors Influencing Good Lighting: (30 minutes)

A. Lamps used.

1. Terminology: lamp, bulb, base, filament.
2. Types of bulbs most common and where used.
3. Grades of bulbs commonly used.
4. Sizes of common bulbs and their main uses.
5. Relative efficiency of large and small bulbs.
6. Color and finish of bulbs.

B. Modification of light by lighting equipment:

1. Effect of diffusing bowls.
 - a. Relation of size of bowl to size of bulb.
2. Effect of shades.

C. Colors and finishes in room.

D. Size of room and height of ceiling.

E. Location of lighting equipment.

F. Care of lighting equipment.

V. Measurement of Lighting: (15 minutes)

A. Explanation of foot candle and light meter.

B. Effect of color on measurement.

C. Effect of size of bulb.

D. Effect of distance.

E. Comparison of artificial light with daylight.

F. Amount of light needed for different tasks.

VI. Lighting Equipment Needed for Type of Seeing Being Done:
(30 minutes).

A. Close seeing tasks--use portable lamps with some general illumination.

1. I.E.S. lamps:

a. Meaning of I.E.S. and main I.E.S. points.

b. Types:

(1) Student: cost, uses, fitting the lamp into the room.

(2) End table: Holophane globe.

(3) Floor lamp: tri-light and 100 watt lamps, location.

2. Smaller lamps:

a. Pin-up.

(1) Cone diffuser.

(2) Full diffusing bowl.

(3) Decorative lamps.

B. General seeing tasks use, for the most part, central fixtures:

1. Types according to lighting given (Semi-direct, direct, semi-indirect, indirect).

2. Types according to shape (Globe, pan, cluster).

VII. Adequate Wiring for Lighting Should be Provided: (5 minutes)

A. Size of wire.

B. Switches.

C. Ceiling outlets and wall brackets.

D. Convenience outlets.

VIII. Summary:

IX. Suggested References:

- A. The Science of Seeing - Text book, Matthew D. Luckiesh, Van Nostrand Co., Inc., N.Y.C. 1937
- B. Artificial Light and Its Application - Text book, Westinghouse Lamp Co., Bridgeport, Connecticut.
- C. Light for the Farm - Bulletin, General Electric Company, Nela Park, Cleveland, Ohio.
- D. Lighting Equipment for the Farm and Farm Home - Rural Electrification Administration, Wash., D. C.
- E. Lighting the Farm Home - Extension Bulletin No. 192, 1938, Ohio State University, Columbus, Ohio.
- F. Better Lighting for the Farm Home - Bulletin No. 356, Oklahoma Extension Service, Stillwater, Oklahoma.
- G. Approved Farm Lighting Practice - Bulletin, Westinghouse Electric Manufacturing Co., 20 North Wacker Drive, Chicago, Ill.
- H. Light Conditioning for your Home - Bulletin, General Electric Company, Nela Park, Cleveland, Ohio.
- I. I.E.S. Bulletins - Series, I.E.S. Better Sight Lamp Makers, 2116 Keith Building, Cleveland, Ohio.

ELECTRIC LIGHTING - PART I

DEVELOPMENT OF DEMONSTRATION OUTLINE

I. Introduction to Demonstration:

Electric lighting is no longer a luxury; it is a necessity. It may be either good or bad; depending on how it is modified, for it like winter air needs conditioning from the raw state so that we may enjoy easier seeing and greater comfort in our homes.

A. Development of lighting of the past.

Appreciation of development of lighting of the past makes lighting of present mean more; the probable historical progress of lighting was as follows: lightning striking, two rocks or dry sticks together, tiny lighted wick floating in oil in natural hollowed out stone, rush torches, fagots saturated in oil, fish stuck on stick, pottery oil lamp, bronze oil lamp, multiple wicks in oil, beeswax and tallow candles, camphire (turpentine and alcohol) kerosene, gas, Welsbach mantle, electricity, in carbon lamp, metalized carbon lamp (gem lamp), tantalum lamp, tungsten filament.

B. Value of good lighting.

Good lighting saves time and energy; aids good health mentally and bodily; increases the comfort, beauty, and safety of the home; and even produces income.

C. Need for planning.

Lighting isn't like "Topsy"; it won't grow up well by itself. Good lighting can be secured at reasonable cost if the lighting job is looked at as a whole and is well planned, and is not permitted to be overbalanced by extravagant fancies or the purchase of poorly designed fixtures and lamps.

D. Need for knowledge of basic principles.

Cost is no indicator of good lighting, so information must serve as a guide. People in towns have used lighting, serving as guinea pigs, as it were, through its less desirable experimental stages. The inadequate lights that city folks have grown up with need not go to the farm now. As a result of research in the "science of seeing" there are plenty of well and scientifically designed fixtures to meet each family's needs and purse.

II. Factors Influencing Good Lighting:

A. Lamps used.

1. A lamp is composed of the bulb or glass part, the base which screws into the socket, and the filament through which electricity passes to produce light - and is commonly called a light or lamp bulb (The term bulb will be used in these demonstrations).
2. Types of bulbs most commonly used: (Show samples.)
 - a. Inside-frosted, pear-shaped, throughout house.
 - b. Three-light bulb in some floor lamps and table lamps, dining fixtures, and occasionally elsewhere.
 - c. Lumiline or tubular bulbs along side of mirrors in baths, or under cabinets above workspaces.
 - d. Silver-bowl bulbs in some adapters and indirect fixtures, also to change over old-style bridge lamps. The lower silvered section makes an indirect lamp of this bulb.
3. For efficient lighting, bulbs should be purchased with the same voltage as the line on which they are to be used, and of a grade to give maximum hours of burning life.
 - a. Mazda: approximately 1000 hours of burning life.
 - b. American-made (domestic non-Mazda): 500 to 750 hours of burning life, bear name of maker, wattage and voltage.
 - c. Nameless-make bulbs, usually imported - 400 to 600 hours of burning life, poorly labeled, inefficient in use of electricity for lighting.
4. Sizes of inside-frosted bulbs and their uses: (Show bulbs.)
 - a. 150 or 100 watt bulbs for reading lamps, kitchen ceiling unit, and ceiling fixture in large bedrooms.
 - b. 75 watt bulb for pin-up lamps, some bracket fixtures, small bedroom ceiling fixture, and 2-bulb cluster fixture.
 - c. 60 watt for porches, halls, stairways, bracket fixtures in kitchen, bath, or dresser lamps, large closets, and

cluster fixtures.

- d. 50 watt "rough service" bulbs for shops and special use.
 - e. 40 watt for smaller closets, 5-bulb cluster fixtures, living room and bracket fixtures.
 - f. 25 watts for living room brackets and decorative lamps.
 - g. 15, 10, 7.5 watts in special places where lamps are left on for long period of time such as in night lights.
5. Larger bulbs are more efficient in lighting than smaller ones; four 25 watt bulbs will give only about 65 per cent the light given by one 100 watt bulb.
 6. Inside-frosted bulbs give less than one per cent less light than clear bulbs, and the light is softer or less glaring in quality. Color absorbs light. Blue or day-light bulbs, while not as efficient because some of the light is lost, give a light more comparable to daylight. They are widely used where work in color is done.

B. Modification of light by lighting equipment.

1. Diffusing bowls soften the light and decrease glare. They are designed in different sizes for different wattage bulbs: 6 inch diameter for 75 watt; 8 inch diameter for 100-150 watt; 10-12 inch diameter for three light lamps of higher wattages. (Show bare bulb, one in diffusing bowl, different size bowls.)
2. Shades direct the light downward, give more light where needed, and protect the eyes. They should be white lined for greatest efficiency. This can be shown by measurement later.

C. Reflection of light.

Light and warm colors reflect more light than do cool and dark colors. Dull finishes diffuse light; glossy ones reflect glare.

D. Location of lighting equipment.

The light sources above eye level are more pleasing than

4.

those at eye level. For right-handed persons, light should come from over the left shoulder, and in all cases from a little to the side and back.

E. Care of lighting equipment.

1. Removal of cellophane from lamp shades gives more pleasing light and prevents warping.
2. Art gum or washing with a damp cloth will clean paper shades; silk ones must be cleaned.
3. Washing or use of a fine abrasive, such as Spanish Whiting, will clean and polish most fixtures.
4. Blackened bulbs should be discarded since as much as a third of the light may be wasted.
5. Bulbs and diffusing bowls should be dusted weekly and wiped with a damp cloth regularly.

III. Measurement of Lighting:--Demonstration and Discussion

- A. Measurement of light shows that light intensity varies inversely proportional to the square of the distance from the source, thus an object three feet away from a light source is only $1/9$ as light. In large rooms or rooms with high ceiling, allowance must be made for this distance factor.

One foot candle is the intensity of light cast by a standard candle on a surface one foot away. It can be measured by a sight meter or light meter which measures light in foot candles on a dial, just as a speedometer registers miles. (Show meter.)

- B. Effect of color on measurement:--demonstration to show measurement of light under an I.E.S. student lamp using:
1. Colored shade lining.
 2. White shade lining.
 3. No shade.
- C. Effect of size of bulb can be compared with a light meter. (Compare 25 reading multiplied by 4 with reading of 100 watt lamp; try beforehand.)
- D. Using a light meter, take reading close under lamp and then in lap as when reading sitting near lamp. Compare.

E. Best possible means of lighting do not begin to compare with daylight lighting:

1. 10,000 foot candles in bright sunlight.
2. 1000 foot candles under shade of tree on bright June day.
3. 500 foot candles in porch shade on same day.
4. 200 foot candles a few feet inside window on same day.
5. 5 foot candles - illumination in average living room after sundown.

F. Amount of light needed for different tasks.

1. 5-10 foot candles for general seeing (conversation, moving about room, listening to radio).
2. 10-20 foot candles for moderate eyework (kitchen tasks, reading good print on white paper, washing, and ironing).
3. 20-50 foot candles for prolonged and intense eyework (reading newspapers or fine print, studying, sewing and mending, shaving or make-up.)
4. 50-100 foot candles for fine detail work (fine sewing or prolonged average sewing).

IV. Lighting for Both General Seeing and Close Seeing Should be Provided:--Demonstration and Discussion

A. For close seeing there should be one tenth as much general illumination in the room as there is light on the close seeing task.

1. I.E.S. lamps provide good lighting for close seeing at a reasonable cost.
 - a. I.E.S. lamps provide light on working surface and send some to ceiling for general illumination. I.E.S. lamps meet the 54 specifications (29 mechanical, 14 electrical, and 11 for seeing safety) of the Illuminating Engineering Society, and are recognizable by an orange and blue I.E.S. tag. They are readily available at reasonable costs, being made by 65 different manufacturers.

- b. I.E.S. student lamps range in price from \$1.95 to \$4.95. (Show features of height of lamp, width of shade to give wide circle of light, white shade lining for efficient light and glass diffusing bowl with 100 watt lamp for enough light and softly diffused light.)
 - c. I.E.S. end table, a little more expensive, has a Holophane globe, and is designed for lower, smaller tables.
 - d. Floor lamp: with either 100 watt or three-light bulb (50-100-150 or 100-200-300 watt).
2. Smaller lamps. -- (Show samples.)
- a. Pin-up lamps may be used in the kitchen over range or sink, in living room or bedroom. They are preferable with white shade linings and are designed to use 75 watt bulbs.
 - b. Vanity lamps should be tall with stable bases and simple ivory or white shades. They use 60 or 40 watt bulbs.
 - c. Decorative lamps are of no use for any close work.
- B. General seeing tasks use for the most part central fixtures of one type or another.
1. Types according to lighting given: (Show samples.)
- a. Semi-direct: (Glass enclosing globe type - direct illumination of diffused nature)
 - 1. Light: Good quality, not so good as from indirect.
 - 2. Places used: Kitchens, laundry, occasionally bedroom and hall.
 - 3. Cost: Economical method of lighting, fixtures low in cost.
 - b. Direct: (All of light directed toward an object by a reflector.)
 - 1. Light: Glaring, undesirable, produces harsh shadow.

2. Places used: Attics, basements, closets, farm buildings.
3. Cost: Cheap to buy, requires smaller bulb.
- c. Indirect: (Light directed up to ceiling and then reflected downward.)
 1. Light: Highest quality, softest.
 2. Places used: Any room; ceilings must be light and in fairly good condition. Two fixtures may need to be used in large room.
 3. Cost: Bulbs used are of higher wattage but cost of operating is not prohibitive. Indirect fixtures can be secured in a wide range of prices.
- d. Semi-indirect: (Some light diffused through upturned translucent bowl, most of it directed to ceiling.)
 1. Light is of good quality, may appear too bright.
 2. Places used: May be used anywhere in home, main living rooms especially.
 3. Cost: Balance of operating cost and efficiency makes this type highly desirable.
2. Types according to shapes: (Show samples and elaborate on discussion.)
 - a. Globe: 8 inch diameter for 100 watts or under; 10 inch diameter for 150 or 200 watts; 12 inch diameter for higher wattage bulbs and special lighting.
 - b. Single bowl or panelled bowl.
 - c. Cluster: Less efficient than either of other types because using several small bulbs rather than one large one.

Adequate Wiring for Lighting Should be Provided: (Elaborate on Discussion)

- A. Size of wire: While No. 14 will accommodate lighting on ceiling and bracket outlets, No. 12 will be a better choice. No. 12 wire is desirable on all convenience outlets and

should be used for outlets in kitchen, dining room and laundry.

- B. Switches should be used to control all ceiling fixtures except those in closets. They may be ivory or brown in color. Single switches control a light from one place, and three-way switches which are a very great convenience, control a light from two points.
- C. Ceiling outlets should be used in every room to provide light for general illumination. Wall brackets if used, are located from five feet to about five feet-six inches from the floor depending on ceiling height.
- D. Convenience outlets: There should be at least two in each room and in main rooms more.

ELECTRIC LIGHTING - PLANNING LIGHTING FOR THE FARM HOME

PART II

The following material was prepared to assist home agents, teachers and others, who may be working with farm women and girls on planning lighting for the farm home.

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PLANNING LIGHTING FOR THE FARM HOME

The following is a suggestive outline to use with groups of farm women in studying and planning lighting for the farm home. However, it may be adapted for use in 4-H clubs and high school home economics classes.

I. Objective:

To choose fixtures and lamps suitable to the needs and income of the family.

To know bulbs of proper wattage to be used in these fixtures.

To plan lighting and wiring of a home that will provide for both close and general seeing tasks.

To examine all lighting for three main points of good lighting.

II. Setup for Demonstration:

A. Samples of and posters with pictures of:

1. Kitchen unit.
 2. Lumiline lamp.
 3. Bathroom fixture.
 4. Pin-up lamp.
 5. I.E.S. dining room fixture (or three-light floor lamp which resembled it).
 6. Living and dining room central ceiling fixtures with shaded lamps.
 7. Bedroom ceiling fixture.
 8. Night light.
 9. Vanity lamp.
 10. I.E.S. student lamp.
 11. I.E.S. floor lamp.
 12. R.L.M. reflector.
13. Folders on "package lighting" from different manufacturers using this plan.

- C. Adapters and pictures of adapters or modernizers.
- D. House plan and chart of wiring symbols.
- E. Bridge tables, blackboard, extension cords, cube plugs, and bulletin display.

III. Introduction:

- A. Tie-in with previous lesson (Part I).
- B. Need for planning.

IV. In Planning the Lighting for the Farm Home Consider:

- A. Amount of money to spend.
- B. Family needs.
- C. Harmony of architecture, furnishings, lamps and fixtures.
- D. Effect of color and finish on light.
- E. Ease of cleaning.
- F. Location for convenience and safety.
- G. Good lighting.
 - 1. Enough light: Large enough bulbs in fixtures and lamps; and lamps in enough places.
 - 2. Good quality light: Softly diffused and well-shaded.
 - 3. Light well-directed and properly distributed or balanced in room for general seeing and for close seeing tasks.

V. Room-by-Room Analysis:

A. Kitchen.

- 1. Requirements:
 - a. Tasks done.
 - b. Quantity: At least 1 watt per square foot of floor space.
 - c. Quality: Free from sharp shadows.

2. Fixtures.

- a. Types for general work and for special work spaces.
- b. Location.
- c. Control.

3. Cost and size of fixtures, lamps and bulbs.

B. Dining Room.

1. Requirements for different uses of room:
 - a. Eating and conversation.
 - b. Study or other close work.
2. Costs and size of fixtures and bulbs.

C. Living Room.

1. Requirements; lighting must be provided for:
 - a. Close seeing.
 - b. General seeing.
2. Use of general lighting with portable lamps for close seeing tasks.
3. I.E.S. lamps.
4. Cost, and securing economic balance between light for general seeing and close seeing tasks to be sure that portable lamps are provided for reading, etc.

D. Bedroom.

1. General lighting.
2. Lighting for dresser.
3. Reading lamps.
4. Night light.
5. Costs and sizes of fixtures, lamps and bulbs.

E. Bathroom.

1. Requirements:

- a. Lighting on both sides of mirror.
- b. Safety.

2. Costs and size of fixtures.

F. Laundry.

1. Requirements - general illumination and extra lighting for special tasks.

2. Costs and sizes of fixtures.

G. Closets.

H. Halls.

I. Porch.

J. Lighting for profit.

- 1. Poultry lighting.
- 2. Pig brooding.
- 3. Health - lighting for humans and animals.
- 4. Safety.

VI. Adapters.

A. Need for adapters.

B. Types of adapters.

C. Cost.

VII. Planning and Lighting for a Home (Making Use of Room Plan and Wiring Symbols).

VIII. Buying Equipment:

- A. Where available.
- B. How purchased.
- C. How financed.

IX. Installation of Equipment:

- A. Secure a good wiring contractor.
- B. Decide location of lighting and other equipment.
- C. Design wiring for present and future needs.
- D. Control lighting at convenient places.

X. Summary:

XI. Suggested references:

- A. The Science of Seeing - Text book, Matthew D. Luckiesh, Van Nostrand Co., Inc., N.Y.C. 1937.
- B. Artificial Light and Its Application - Text book; Westinghouse Lamp Co., Bridgeport, Connecticut.
- C. Light for the Farm - Bulletin, General Electric Company, Nela Park, Cleveland, Ohio.
- D. Lighting Equipment for the Farm and Farm Home - Rural Electrification Administration, Washington, D. C.
- E. Lighting the Farm Home - Extension Bulletin No. 192, 1938, Ohio State University, Columbus, Ohio.
- F. Better Lighting for the Farm Home - Bulletin No. 356, Oklahoma Extension Service, Stillwater, Oklahoma.
- G. Approved Farm Lighting Practice - Bulletin, Westinghouse Electric Manufacturing Co., 20 North Wacker Drive, Chicago, Ill.
- H. Light Conditioning for your Home - Bulletin, General Electric Company, Nela Park, Cleveland, Ohio.
- I. I.E.S. Bulletins-Series, I.E.S. Better Sight Lamp Makers, 2116 Keith Building, Cleveland, Ohio.

PLANNING LIGHTING FOR THE FARM

PART II

I. Introduction:

- A. Having familiarized ourselves with the need for lighting, its sources, how lighting is influenced by bowls, shades, and other surrounding factors, how it can be measured, and having learned what is good in portable lamps and different types of fixtures, we are ready to begin the planning of lighting for the farm home.
- B. Planning is necessary if lighting is to protect our eyesight, save our time and energy, be attractive, safe and economical.

II. In Planning Lighting for the Farm We Should Consider:-- Discussion and Demonstration.

- A. Amount of money to spend: Since attractive fixtures and lamps which give good lighting can be secured at low cost, careful planning will allow us to keep within our lighting budget. We may thus be able to have money available for other further advantages of electricity.
- B. Family needs.
 - 1. Age of members: Older members of the family have higher light requirements, because of aging eyes, than younger persons.
 - 2. Condition of eyes: Defective eyes require more and better quality lighting than healthy eyes.
 - 3. Light requirements: The amount of light needed for the same task varies with different individuals.
 - 4. Other desires of family: Whether the beauty of fine materials in expensive lighting equipment is more important than other electrical equipment, travel, books, etc., must be judged by each family.
 - 5. Tasks and habits: The daily activities and habits of the family and places where these things are done should be carefully analyzed so that proper lighting is provided for them.
 - 6. Home ownership and tenancy: Permanency of occupation will influence the number of convenience outlets and type of fixtures used. Portable lamps and adapter type fixtures make it possible for the tenant to have good lighting, should he change locations.

- C. Harmony of architecture, furnishings, lamps and fixtures: Simplicity of line and design, with light soft tans in shades (white linings) will fit well into the average farm home. Repetition of idea between fixtures in adjoining rooms or between shades or bases of portable lamps produces a pleasing effect.
- D. Effect of color and finish on light: Light colors, especially in walls, are cheerful and more economical in lighting, because they waste less light by absorption. Dull finishes prevent reflection of glare.
- E. Ease of cleaning: Ornately decorated lighting equipment should be avoided because it is more difficult to dust, and tarnishing metals will require special care. The superior lighting qualities of inverted bowl type fixtures makes it advisable to purchase them, though it may seem that they would be harder to keep clean.
- F. Location for Convenience and Safety.
 - 1. Switches controlling lights at opposite and most used entrances to rooms, at foot and head of stairs, Portable lamps located near most used chairs and special lights over work spaces will add greatly to convenience.
 - 2. Porches, halls, stairways, basements and narrow entrances should be carefully lighted. Near water or in damp places, care should be taken to have lamps switch-controlled and switches, sockets, etc., of a composition or porcelain material rather than metal.
- G. Good Lighting.
 - 1. Enough light.
 - a. Large enough bulbs: While more detailed information can be given, 1 watt per square foot of floor space is well remembered as a minimum. 100 watt bulbs should be used in reading lamps and 60 watt bulbs will fit most other places.
 - b. Lamps in enough places: In addition to central fixtures, which are of value in breaking contrasts and for general seeing tasks, light should be provided at special work spaces; and portable lamps should be placed to the left and rear of comfortable chairs and also on study tables or desks.

2. Good quality light.

- a. Softly diffused (Show I.E.S. diffusing bowl or kitchen glove and bare bulb lighted).
- b. Well shaded (review and show points of broad, door shade of I.E.S. lamp with its white lining).

3. Light well directed and properly distributed or balanced in a room: One-tenth as much general illumination should be provided throughout room as is available under portable lamps, to prevent strain of looking up from brightly lighted book into contrast of dark corner. General illumination from the central fixtures should be used in addition to the portable lamps, though, if several I.E.S. lamps are lighted at the same time in a room, enough general illumination may be provided without central fixture.

III. Room-by-Room Analysis:

- A. Kitchen: To give plenty of good light for the many tasks done in the kitchen, 100 to 150 watt bulbs should be used in the ceiling fixture, and sometimes two ceiling fixtures should be used, or shaded fixtures with 60 watt bulbs should be placed over the sink or range, in addition to the ceiling fixture.
- B. Dining Room.
 - 1. Eating and conversation: A ceiling fixture of either the cluster or inverted bowl type with shaded bulbs, and using at least a 100 watt bulb, or two or three 60 watt bulbs provides sufficient light for these general seeing tasks.
 - 2. Study and other close work in addition to eating and conversation: An I.E.S. dining room fixture with at least a 100 watt bulb, or usually a 100-200-300 combination bulb, is recommended.
- C. Living Room: Ceiling fixtures should not be used for close seeing tasks. I.E.S. portable lamps with 100 watt bulbs should be used while reading or sewing, and enough general illumination should be provided with them from central fixtures to prevent sharp contrasts or gloom.

D. Bedroom.

1. A central ceiling fixture controlled by a switch at the door should have a shaded bulb of 100 watts, three 40 watt bulbs, or in a small room a 75 watt bulb.
2. Dresser light: Vanity lamps on each side of the mirror should have 60 watt bulbs. Pin-ups may be substituted for the vanity lamps.
3. Reading in bed: An I.E.S. student lamp with 100 watt bulb or a pin-up lamp with a 75 watt bulb may be used.
4. Small night lights with $7\frac{1}{2}$ watt bulbs may be plugged into a convenience outlet. They cost less than fifty cents.

E. Bathroom: In small baths 60 watt bulbs in shaded fixtures on both sides of the mirror provide enough light. Larger rooms will need a ceiling fixture in addition.

F. Laundry: For dark ceilings an RLM porcelain enameled dome-type reflector with 100 or 150 watt bulb; for light ceilings a kitchen-type enclosing globe should be used. Separate lights over work spaces should use 60 watt bulbs shaded.

G. Closets: A 60 or 40 watt bare bulb with a pull chain is satisfactory. 60 watt bare bulbs may also be used in basements and attics.

H. Halls: Use a 60 watt bulb or two or three 40 watt bulbs in a shaded-type fixture or good glass diffusing bowl.

I. Porch: 60 watt bulb in either overhead or side wall fixtures of enclosing type.

J. Lighting can pay its own way and dividends besides when used for poultry or stock. Through decreasing fire hazards and preventing falls it pays an unmeasured dividend in safety.

IV. Adapters or modernizers will aid the family who has antiquated and poor lighting equipment already installed. They are inexpensive, ranging from ten cents for the single candle lamp shades to two or three dollars for the largest pieces, though usually less.

A complete and attractive fixture can be secured and installed merely by screwing it into the socket. Adapters are usually made of parchment or plastic.

- V. Planning the Lighting for a Home: Using charts and symbols or the blackboard and other illustrative material, go through the planning of the lighting of a typical farm home with the group.

VI. Buying Equipment:

A. Where available:

1. Fixtures: Local wiremen will order them, or they may be secured from stores in nearby towns which carry them (hardware stores, electric shops, mail-order houses, distributors' centers).
2. Lamps: Public Service companies, furniture stores, hardware stores and general merchandise stores.

B. How purchased:

1. Package plan: A group of fixtures to fit a whole house for a unit price, such as \$19.95; \$24.95; and \$29.95. (Discuss REA fixture plan.)
2. Individual purchase: Buying each fixture separately usually costs more.

C. How financed:

1. For members on R.E.A. lines between \$50.00 and \$400.00 loans are available for financing wiring, fixtures and plumbing. (Discuss finance plans.)

D. Keep standards of selection, etc., in mind when buying.

- VII. Installation of Equipment: Location of lighting and convenience outlets should be discussed with wiring contractor. Enough circuits should be provided; switches should be planned to have lights controlled in as many places as possible; and convenience outlets should be located so that future needs, as well as present ones, will be included. In main rooms no place on the wall should be more than six feet from a convenience outlet.

VIII. Summary: To light the rural farm home well, we must adjust the amount of money to spend, the family's activities, and decorative considerations to good lighting standards providing:

A. Enough light.

1. Large enough bulbs, usually 60 - 100 watt bulbs.
2. Light in enough places in order to carry on the various activities of the home easily and comfortably.
3. Light-colored reflecting surfaces.

B. Light of good quality.

1. Softly diffused: prismatic or translucent diffusing materials should break the light up at its source, and it should be further diffused by dull reflecting surfaces so that shadows are either completely absent or quite indistinct.
2. Well shaded: Light, broad shades should be used with white linings.
3. Well directed: All light should be free from glare.

C. Well-balanced, with a minimum of contrast: There should be at least one-tenth as much light over room, as on seeing task under portable lamp.

1. The purpose of this report is to provide a summary of the results of the study conducted by the research team. The study was designed to investigate the effects of the proposed intervention on the target population. The results of the study are presented in the following sections.

A. Study Design

1. The study was conducted using a randomized controlled trial design. The participants were randomly assigned to either the intervention group or the control group.

2. The study was conducted over a period of 12 weeks. The intervention group received the proposed intervention, while the control group received a placebo. The results of the study are presented in the following sections.

3. The study was conducted in a controlled environment. The participants were recruited from a local community center. The results of the study are presented in the following sections.

B. Study Population

1. The study population consisted of 100 participants. The participants were recruited from a local community center. The results of the study are presented in the following sections.

2. The study population was divided into two groups: the intervention group and the control group. The results of the study are presented in the following sections.

3. The study population was recruited from a local community center. The results of the study are presented in the following sections.

4. The study population was recruited from a local community center. The results of the study are presented in the following sections.

